Chapter 3

Length, Area, and Volume

Kristi Hansen is a Red Seal plumber. Calculating the capacity of water lines, determining the length of pipe needed for drainage systems, and accurately predicting the volume of hot water a building's system will use are some of her tasks.

3.1 Systems of Measurement

REVIEW: WORKING WITH PERIMETER

perimeter: the sum of the lengths of all the sides of a polygon

In this section, you will calculate the **perimeter** of different shapes.

A square is a quadrilateral with 4 equal sides, so the perimeter can be found by the following formula:

$P = 4 \times (side\ length)$

The perimeter of a rectangle with length ℓ and width w can be found by the following formula:

$P = 2\ell + 2w$

$P = 2(\ell + w)$

Overview of Unit on Measurement

- SI system (metric system)
- Imperial system
- Converting within and between
- Measuring
- Calculating lengths, volumes, areas, perimeters, surface areas, mass, temperatures in both systems
- 2-D & 3-D shapes

Metric system intro.

http://www.youtube.com/watch?v=MekxJse2vgs

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Système International (SI)- the metric system.

- basic unit of length is the metre

Imperial System- until 1970s it was the measuring system in Canada.

- system used in the United States.

- basic unit of length is the foot.

Converting Between SI units

Conversions between units, is a skill needed when working with the metric system. The following example should be your primary way of converting units.

Example: convert 152 meters in centimeters.

this fraction is an equivalency that features the unit you are converting from as the denominator - and your target unit as the numerator

Solution:

the value you are converting → $\frac{152\text{m}}{} \times \frac{100\text{ cm}}{1\text{ meter}} = 15{,}200\text{cm}$

this is the answer obtained by canceling the meter units - leaving centimeters - which was your target unit

Practice converting – show all your working which means using the conversion factor and units!!!!!

1. 130 cm to m
2. 96.3 cm to m
3. 3.25km to cm

$130\,cm \times \frac{1\,m}{100\,cm} = 1.3\,m$

$96.3\,cm \times \frac{1\,m}{100\,cm} = 0.963\,m$

$3.25\,km \times \frac{1000\,m}{1\,km} \times \frac{100\,cm}{1\,m} = 325\,000\,cm$

GMF 10 – Imperial System

In Canada we use both the metric and imperial system. The imperial system is used in many trades like plumbing and carpentry. The imperial system is not a decimal system. Each group of units has a particular relationship.

Units for length:

1 inch (in or ")				
1 foot (ft or ')	12 inches			
1 yard (yd)	36 inches	3 feet		
1 mile (mi)		5280 feet	1760 yards	

GMF 10 Graham

Practice converting – show all your working which means using the conversion factor and units!!!!!

1. 41 inches to cm

$41'' \times \frac{2.54\text{cm}}{1''}$

$= 104.14\text{cm}$

2. $5\frac{1}{2}$ yds to inches

$5\frac{1}{2}\text{yd} \times \frac{36''}{1\text{yd}}$

$= 198 \text{ inches}$

3. 6 ft to yards

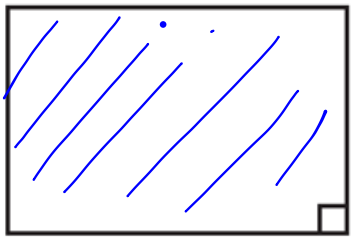
$6\text{ft} \times \frac{1\text{yd}}{3\text{ft}}$

$= 2\text{yds}$

Examples

Calculate the area of each figure:

(a)



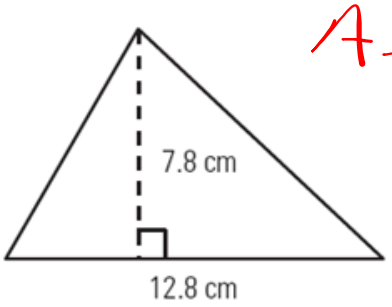
$A = 6.8 \times 4.5$

$A = 30.6\ cm^2$

$30.6\ cm^2 \times \frac{1\ in^2}{(2.54\ cm)^2}$

Area in cm^2 = 4.7 ; in^2

(b)



$A_T = \frac{6 \times 5}{2} = 49.92\ cm^2$

$49.92\ cm^2 \times \frac{1\ in^2}{(2.54\ cm)^2}$

Area in cm^2 = 7.7 ; in^2